**C** **Reg. No. :** | | | | | | | | | | |

**Question Paper Code: 93402**

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2022

Third Semester

Electronics and Communication Engineering

19UEC302 - Digital Electronics and Design

(Regulations 2019)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. Which of the following gate is called universal gate? CO1- U

   (a) AND (b OR (c) XOR (d)NAND

2. In a combinational circuit, the output at any time depends only on the _____ at that time. CO2- U

   (a) Voltage (b) Intermediate values (c) Input values (d) Clock pulses

3. Latches constructed with NOR and NAND gates tend to remain in the latched condition due to which configuration feature? CO3- U

   (a) Low input voltages (b) Synchronous operation

   (c) Gate impedance (d) Cross coupling

4. What is/are the crucial function/s of memory elements used in the sequential circuits? CO4- U

   (a) Storage of binary information (b) Specify the state of sequential

   (c) Both a & b (d) None of the above

5. The evolution of PLD began with _____ CO5- R

   (a) EROM (b) RAM (c) PROM (d) EEPROM

PART – B (5 x 3= 15 Marks)

6. Implement Boolean expression for EX - OR gate using NAND gates only. CO2 App

| | | | | |
|---|---|---|---|---|
| 7. | | Implement the half adder using OR gate. | CO2 App | |
| 8. | | Design for a 5-bit ring counter using J-K flipflops. | CO3 U | |
| 9. | | Classify static 1 and static 0 hazards. | CO4 U | |
| 10. | | How many programmable gates are needed for PROM?. | CO5 U | |

PART – C (5 x 16= 80 Marks)

| | | | | |
|---|---|---|---|---|
| 11. | (a) | Simplify the following Boolean expressions:<br>(i) F1= A'BC+ABC+B'C+BCD+B'C'D<br>(ii) F2 = ABC+BC+B'C+AC+ACD | CO1- App | (16) |
| | | Or | | |
| | (b) | Express the function $Y = A + \bar{B}C$ in (a) canonical Sum of Product(SOP) and (b) canonical Product of Sum(POS) form. | CO1- App | (16) |
| 12. | (a) | Implement a full adder circuit using two half adders. | CO2- App | (16) |
| | | Or | | |
| | (b) | Design a combinational circuit that converts a four-bit gray code to binary code | CO2- App | (16) |
| 13. | (a) | Design S-R flipflop using T flipflop. | CO3- App | (16) |
| | | Or | | |
| | (b) | How should a J-K flipflop be connected to function as a divide-by-2-element? Justify your answers. | CO3- App | (16) |
| 14. | (a) | Design an asynchronous sequential circuit with two inputs x1 and x2 and one output z. Initially, both inputs are equal to zero. When x1 or x2 becomes '1',the output z becomes 1.When the second input also becomes 1,the output changes to 0.The output stays at 0 until the circuit goes back to the initial state. | CO4- App | (16) |
| | | Or | | |
| | (b) | Design a hazard free switching circuits with relevant examples. | CO4- App | (16) |
| 15. | (a) | Write a brief note on PLD Devices& its operation | CO5- App | (16) |
| | | Or | | |
| | (b) | Implement the following Boolean function using PAL<br>W(A,B,C,D) =∑m(0,2,6,7,8,9,12,13<br>X(A,B,C,D) =∑m(0,2,6,7,8,9,12,13,14)<br>Y(A,B,C,D) =∑m(2,3,8,9,10,12,13),<br>Z(A,B,C,D)=∑m(1,3,4,6,9,12,14) | CO5- App | (16) |